NEWSLETTER

March 2025

# THE PURPEST PROJECT

## NEWS

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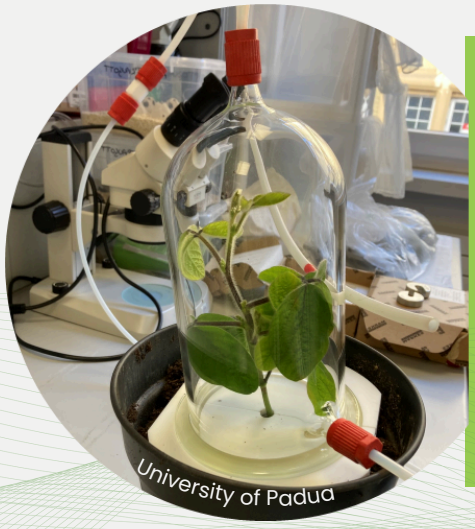
- Project dissemination

## SMALL AND MEDIUM-SIZED ENTERPRISES, FROM RESEARCH TO SOLUTIONS AND IMPACT

Photo: Martin Pettersson




As a strong start to 2025, this **PurPest** issue promotes our latest technological advancements and international collaborations. Our joint efforts with related projects are fostering a dynamic research network, enabling knowledge exchange and shared solutions for plant health challenges. We also want to highlight the important role of small and medium-sized enterprises (SMEs) in bridging research and real-world applications, ensuring that cutting-edge technology is effectively implemented. Join us and explore the latest developments and upcoming initiatives.

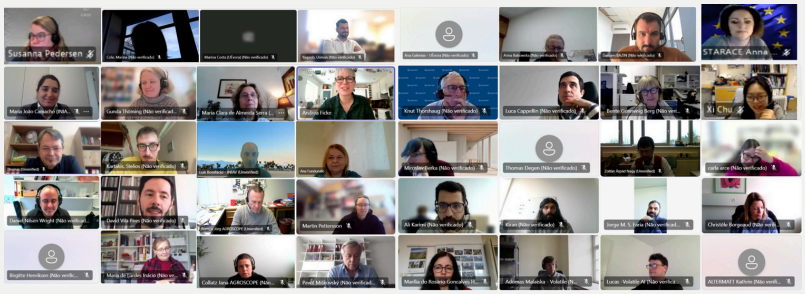
Co-funded by the European Union

# PurPest start of the year activities

**The PurPest project** started the year with:

- **Digital Project Meeting**;
- feature in the European Commission's **AgriResearch Factsheet**;
- two episodes on the **I See Dead Plants** podcast;
- showcase at the **BIOFACH 2025** in Germany;
- collection of **maize VOCs in Mexico**;
- and the collaboration with **HEU projects**.

# Digital Project and GA meetings



On January 15, 2025, the PurPest consortium held its **Digital Project meeting**, followed by the **General Assembly (GA)**, bringing together researchers, stakeholders, and partners to discuss ongoing work, share updates, and plan the next steps for this innovative project on plant pest prevention.

The meeting, chaired by Andrea Ficke, provided a comprehensive overview of progress across **work packages (WPs)**, with each partner presenting their contributions and future plans. It highlighted advancements in data management, VOC analysis, sensor development, and economic impact assessments. Partners contributed data to the shared repository, refining insights into plant pest behavior and VOC emissions. Increased VOC emissions were observed in *Phytophthora*-infected cork oaks and beech trees, while research on the pinewood nematode, fall armyworm, cotton bollworm, and brown marmorated stink bug deepened the understanding of their VOC profiles.

Sensor technology innovations focused on enhancing pest detection by improving Raman spectroscopy with metal–organic framework (MOF) coatings, adapting PickMol for airborne compound detection, optimizing sensor performance, and integrating thermodesorption units for better VOC detection, advancing real-time pest monitoring.

Economic impact assessments provided insights into the financial consequences of plant pests, with estimates revealing potential losses reaching billions of euros annually. In terms of outreach and engagement, the meeting also reinforced international collaborations.

Looking ahead, the next in-person meeting will take place from June 11-13, 2025, in Évora, Portugal, offering further opportunities for hands-on collaboration and project advancements.

# Expanding international collaborations

Leaders and members from the **PurPest**, **COMPAS**, **REACT**, and **BeXyl** projects recently held a joint digital meeting to further strengthen and formalize their collaborative efforts. The meeting provided a valuable opportunity to discuss synergies and explore common interests across the four projects. Participants identified shared topics, potential opportunities, and outlined future steps to enhance and expand their international cooperation network. This collaborative exchange highlights the importance of cross-project partnerships in advancing research and innovation, fostering a dynamic and interconnected approach to tackling common challenges.

# The strength of SMEs for detection technology

**Small and medium-sized enterprises (SMEs)** play an important role in the PurPest project, advancing the technological innovation and bridging the gap between research and market application. The consortium includes technology-focused SMEs, **SAFTRA Photonics**, **airmotec AG**, part of the **Chromatotec Group**, and **Volatile AI,** which all contribute their specialized expertise in sensor development, pest detection, and commercialization strategies. Additionally, **Plante Og Importkontroll AS** and **Centro PINUS** serve as active stakeholders, bringing practical application knowledge and sector-specific insights to the project.

Each SME brings a unique advantage to the project. SAFTRA Photonics specializes in nanotechnology, photonics, and biomedicine, while airmotec AG focuses on analytical solutions for gas and liquid characterization, develop and implement a portable GC system to monitor and analyse VOCs. Volatile AI combines chemical analysis instrumentation with artificial intelligence algorithms, enhancing the project's capabilities in gas sensing and data interpretation. Plante Og, a Norwegian company, specializes in plant importation, acceptance control, and training, ensuring user-friendly solutions through sensor testing and feedback. Centro PINUS, a Portuguese non-profit association, unites stakeholders in the pine-based sector, focusing on improving forest productivity and aligning solutions with industry needs.

The involvement of these SMEs ensures that research outcomes are translated into practical, tangible solutions. By collaborating closely with universities and research institutions, the technology-focused SMEs gain access to scientific advancements while providing the agility and market-oriented approach necessary for rapid technology deployment. Meanwhile, the industry stakeholders ensure that solutions are grounded in real-world applications and sector-specific requirements. Together, these strategic partnerships within PurPest enhance the project's overall impact and help expand technology-based phytosanitary solutions across Europe.


Production, development, and inoculation of *Rhododendron* and *Larix* plants with *Phytophthora* cultures at **NIBIO**. Collection of VOCs is done routinely on a weekly basis.

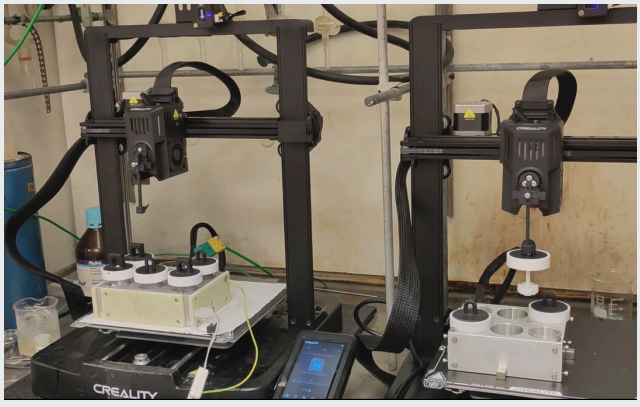
# PurPest educational materials

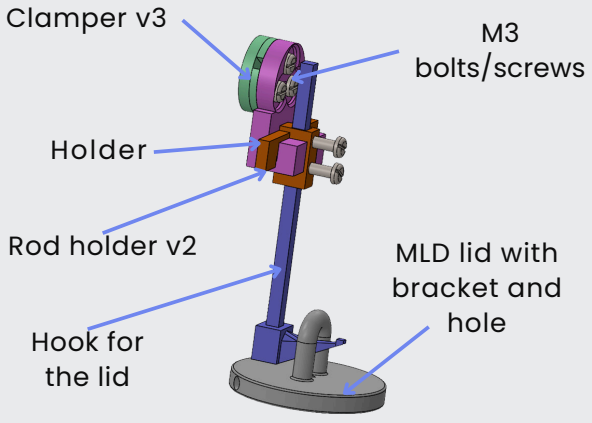

A new educational material developed under the PurPest project, serving as a comprehensive guide, is now available on the PurPest website. It provides a detailed and practical protocol for researchers, practitioners, and students to effectively use the **Headspace Collecting Device (HSCD)** for volatile organic compound (VOC) sampling. Developed by Ali Karimi and Jürgen Gross from the **Julius Kühn-Institut**, this document is part of Work Package 1 (WP1).

The educational material outlines the step-by-step process of preparing and conditioning materials for VOC collection, along with valuable hints to avoid contamination and ensure accurate analysis using thermal desorption devices connected to gas chromatography–mass spectrometry (GC-MS). The HSCD, a portable digital 6-channel device, is designed for precise VOC collection in various environmental conditions, making it an essential tool for field sampling in pest prevention. By making complex processes accessible and replicable, this guide enables researchers and practitioners to contribute to the fight against plant pests. For future materials, check the **website** for updates.

# Automating Molecular Layer Deposition

For PurPest, **SINTEF** has developed two custom-built robots, **RoboTerje** and **RoboKnut**, to automate a precise yet time-consuming process called **Molecular Layer Deposition (MLD)**. This method builds materials layer by layer by exposing them to different chemical solutions. By replacing manual handling, this approach ensures more consistent results while saving hours of repetitive work. In the PurPest project, MLD is used to create **Surface Metal-Organic Frameworks (SURMOFs)**, which are sensitive layers designed to capture specific volatile organic compounds (VOCs).

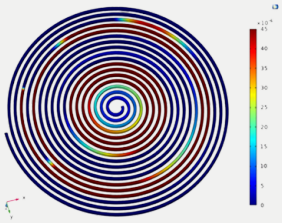



Adapted from **3D printers**, the robots have been customized to carefully dip samples into chemical solutions at controlled temperatures. A user-friendly interface allows researchers to set the dipping sequence, timing, and number of layers, while the robots handle the rest with precision. However, as they lack fault-detection sensors, they still require monitoring. With RoboTerje and RoboKnut on the job, PurPest team is achieving greater efficiency and consistency, as well as freeing up time for more innovation and discovery.

See **RoboTerje** and **RoboKnut** in action in their debut movie available on the **PurPest channel**!

# Technological progress update



3D printed μ-GC column developed at University of Warwick

Technological developments are focused on improving more efficient, precise, and scalable plant pest detection methods. Collaborative efforts are bringing us closer to solutions that will have a lasting impact on sustainable agriculture and environmental protection. Over the past few months, work has focused on enhancing key components of detection and analysis systems.

Recent progress includes evaluating different packing materials for BVOC analysis, advancing micro-Gas Chromatography (μ-GC) technologies, assembling prototype for testing, and refining sensor architecture for improved detection capabilities. Additionally, advanced coatings are undergoing validation to optimize sensitivity and stability, while innovative detection technologies, including SERS-based sensors and PickMol technology, are showing promising results for VOC identification.

# PurPest in the EC AgriResearch on plant health

The PurPest project has been highlighted in the European Commission's **AgriResearch Factsheet**, recognizing its key role in tackling plant pest outbreaks through advanced monitoring and site-specific control technologies. Globalization, climate change, and increased international trade and travel have significantly accelerated the spread of plant pests and diseases. Beyond economic consequences, plant health threats also have profound social and environmental implications, affecting rural livelihoods and the stability of food supply chains.

In response to these challenges, the EU remains committed to reducing chemical pesticide use and continues to invest in **integrated pest management (IPM)** solutions under **Horizon 2020** and **Horizon Europe**. It funds projects that develop science-based approaches to detect, monitor, prevent, and manage plant pests and diseases.

To address these challenges, the EU is focusing on:

- Early detection and monitoring of plant pests to prevent outbreaks.
- Reducing pesticide use by 50% by 2030 under the Farm2Fork and Biodiversity strategies.
- Developing sustainable IPM solutions that prioritize non-chemical control methods.
- Supporting farmers and policymakers with tools and networks for plant health management.


PurPest, along with our collaborating projects, is at the forefront of these efforts, pioneering sustainable and innovative approaches to pest prevention. Being featured in the EU AgriResearch underscores PurPest's role in advancing effective plant protection measures and supporting Europe's transition to environmentally friendly pest management strategies.

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